

## CLAIMS

1. A porous fiber containing pores each having a diameter of 100 nm or less, wherein the area ratio of pores each having a diameter of 200 nm or more to the total cross section of the fiber is 1.5% or less, and wherein the pores are unconnected pores.

2. A porous fiber containing pores each having a diameter of 100 nm or less, wherein the area ratio of pores each having a diameter of 200 nm or more to the total cross section of the fiber is 1.5% or less, wherein the pores are connected pores, and wherein the fiber has a strength of 1.0 cN/dtex or more.

3. The porous fiber according to claim 1 or 2, wherein the area ratio of pores each having a diameter of 50 nm or more to the total cross section of the fiber is 0.1% or less.

4. The porous fiber according to any one of claims 1 to 3, wherein the pores have an average diameter of 5 to 30 nm.

5. The porous fiber according to any one of claims 1 to 4, wherein the porous fiber is partially fibrillated to have fibrils each having a diameter of 0.001 to 5  $\mu\text{m}$ .

6. The porous fiber according to any one of claims 1 to 5,  
wherein the porous fiber is crimped.

7. The porous fiber according to any one of claims 1 to 6,  
wherein the porous fiber has a strength of 1.5 cN/dtex or  
more.

8. The porous fiber according to any one of claims 1 to 7,  
comprising 80% by weight or more of a polyester or polyamide.

9. The porous fiber according to any one of claims 1 to 8,  
wherein the porous fiber has a ratio of moisture adsorption  
( $\Delta$ MR) of 4% or more.

10. The porous fiber according to any one of claims 1 to 9,  
wherein nanopores are unevenly distributed at cross section  
of a fiber, and wherein the area ratio of the nanopores to  
the total cross section of the fiber is 30% or more.

11. A yarn or cut fiber comprising the porous fiber  
according to any one of claims 1 to 10 in combination with  
one or more other fibers.

12. A fibrous article at least partially comprising the  
porous fiber according to any one of claims 1 to 10 or the

yarn or cut fiber according to claim 11.

13. A fibrous article comprising the porous fiber according to any one of claims 1 to 10 or the yarn or cut fiber according to claim 11 in combination with one or more other fibers.

14. The fibrous article according to claim 12 or 13, which is a woven fabric, a knitted fabric or a nonwoven fabric.

15. The fibrous article according to claim 11 or 12, which is selected from clothing, products for interior, livingwares and industrial materials.

16. The fibrous article according to any one of claims 11 to 15, comprising one or more functional materials.

17. A polymer alloy fiber having an islands-in-sea structure and comprising a lower soluble polymer as a sea part; and a higher soluble polymer as islands parts, the islands constituting a lined structure, wherein the area ratio of islands each having a diameter of 200 nm or more to the total islands is 3% or less.

18. The polymer alloy fiber according to claim 17, wherein

the area ratio of islands each having a diameter of 100 nm or more to the total islands is 1% or less.

19. The polymer alloy fiber according to claim 17 or 18,  
5 wherein the islands have an average diameter of 1 to 100 nm.

20. The polymer alloy fiber according to any one of claims 17 to 19, wherein the islands have an average diameter of 10 to 50 nm.

10 21. A polymer alloy fiber comprising two or more polymers having different solubilities, wherein the polymers having different solubilities constitute a layered structure at cross section of a fiber, wherein higher soluble polymer  
15 layers have an average thickness of 1 to 100 nm, and wherein a layered structure comprising higher soluble polymer layers having a lined structure at longitudinal section of a fiber occupies 50% or more of the area of a cross section of the fiber.

20 22. The polymer alloy fiber according to any one of claims 17 to 21, wherein the content of the islands-part polymer is 10 to 30% by weight of the total fiber.

25 23. The polymer alloy fiber according to any one of claims

17 to 22, wherein the higher soluble polymer is a polymer easily soluble in an alkaline solution.

24. The polymer alloy fiber according to any one of claims 17 to 22, wherein the fiber has an Uster unevenness of 0.1 to 5%.

25. The polymer alloy fiber according to any one of claims 17 to 24, wherein the fiber has an elongation percentage of 70 to 200%.

26. The polymer alloy fiber according to any one of claims 17 to 25, wherein the fiber has a CR as an indicator of crimp properties of 20% or more, or the number of crimp is 5 or more per 25 mm.

27. The polymer alloy fiber according to any one of claims 17 to 26, which is a conjugated fiber comprising a polymer alloy and one or more other fibers.

28. A yarn or a cut fiber comprising the polymer alloy fiber according to any one of claims 17 to 27, and one or more other fibers and constituting a combined filament yarn, a blended yarn or a blended cut fiber.

29. A package or a felt, comprising the polymer alloy fiber of any one of claims 17 to 27 or the yarn or cut fiber of claim 28.

5 30. A fibrous article at least partially comprising the polymer alloy fiber of any one of claims 17 to 27 or the yarn or cut fiber of claim 28.

10 31. A fibrous article comprising the polymer alloy fiber of any one of claims 17 to 27 or the yarn or cut fiber of claim 28 in combination with one or more other fibers.

32. The fibrous article according to claim 30 or 31, which is a woven fabric, a knitted fabric or a nonwoven fabric.

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33. Pellets of a polymer alloy comprising a polyamide and a polyester, wherein a dispersed polymer component is dispersed in an average diameter of 1 to 50 nm.

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34. The pellets according to claim 33, wherein the area ratio of coarse particles of the dispersed polymer component having a diameter in terms of circle of 100 nm or more at cross section of a pellet is 3% or less of the total dispersed polymer particles at cross section of a pellet.

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35. Pellets of a polymer alloy, comprising a polyamide and a polyester, containing 30 to 90% by weight of a polyester copolymerized with 1.5 to 15% by mole of a sulfonate and having an average weight of 2 to 15 mg.

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36. The pellets according to any one of claims 33 to 35, wherein the pellets contain terminal amino groups in an amount of  $6 \times 10^{-5}$  molar equivalent per gram.

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37. Pellets of a polymer alloy, comprising a polymer selected from polyamides, polyesters and polyolefins; and a polyetherester being soluble in hot water, wherein the content of the polyetherester is 10 to 30% by weight, and wherein the pellets have a  $b^*$  value as an indicator of coloring of 10 or less.

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38. A method for melt-spinning a polymer alloy fiber, comprising the steps of weighing and feeding a lower soluble polymer and a higher soluble polymer independently to a twin-screw extrusion-kneader, melting and blending the polymers in the twin-screw extrusion-kneader to form a polymer alloy, and melt-spinning the polymer alloy, wherein the spinning is carried out so as to satisfy the following conditions (1) to (3):

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(1) the content of the higher soluble polymer in the

polymer alloy is 5 to 60% by weight;

(2) the ratio in melt viscosity of the lower soluble polymer to the higher soluble polymer is 0.1 to 2; and

(3) the length of a kneading section of the twin-screw extrusion-kneader is 20 to 40% of the effective length of screws.

39. A method for melt-spinning a polymer alloy fiber, comprising the steps of weighing and feeding a lower soluble polymer and a higher soluble polymer independently to a static mixer having a number of splits of  $100 \times 10^4$  or more, melting and blending the polymers in the static mixer to form a polymer alloy, and melt-spinning the polymer alloy, wherein the spinning is carried out so as to satisfy the following conditions (4) and (5):

(4) the content of the higher soluble polymer in the polymer alloy is 5 to 60% by weight; and

(5) the ratio in melt viscosity of the lower soluble polymer to the higher soluble polymer is 0.1 to 2.

40. A method for melt-spinning a polymer alloy fiber comprising a lower soluble polymer and a higher soluble polymer, comprising storing and dry-blending two or more different pellets in a blending tank before melting of the pellets, feeding the dry-blended pellets to a melting section,



and blending and melt-spinning the dry-blended pellets,  
wherein the spinning is carried out so as to satisfy the  
following conditions (6) to (8):

(6) the content of the higher soluble polymer in the  
5 fiber is 5 to 60% by weight;

(7) the ratio in melt viscosity of the lower soluble  
polymer to the higher soluble polymer is 0.1 to 2; and

(8) the blending tank can contain 5 to 20 kg of pellets.

10 41. The method for melt-spinning a polymer alloy fiber  
according to any one of claims 38 to 40, wherein the content  
of the higher soluble polymer in the resulting blend is 10 to  
30% by weight.

15 42. The method for melt-spinning a polymer alloy fiber  
according to any one of claims 38 to 40, wherein the content  
of the higher soluble polymer in the resulting blend is 15 to  
25% by weight.

20 43. The method for melt-spinning a polymer alloy fiber  
according to any one of claims 38 to 42, further comprising a  
polyamide containing terminal amino groups in an amount of  
 $5.5 \times 10^{-5}$  molar equivalent or less per gram as the lower  
soluble polymer.

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44. The method for melt-spinning a polymer alloy fiber according to any one of claims 38 to 43, further comprising carrying out the spinning at temperatures of 300°C or less.

5 45. A method for crimping the polymer alloy fiber of any one of claims 17 to 25, wherein heat treatment is carried out at temperatures not exceeding [(the melting point of the lower soluble polymer) - (50°C)].

10 46. A method for producing a fibrous article, at least partially comprising the step of reducing the fibrous article of any one of claims 29 to 32 so that a polymer alloy fiber as a precursor of a porous fiber in the fibrous article is reduced in weight at a rate of 20% by weight or more per hour.

15 47. A method for producing a fibrous article, comprising the step of physically napping the fibrous article of any one of claims 11 to 14 to fibrillate a porous fiber.